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ABSTRACT

There are two types of errors made in feeling-of-knowing (FOK) studies: a commission error occurs when a subject answers a question incorrectly, and an omission error occurs when a subject fails to provide an answer for a given question. A subject makes a commission error if he or she responds to the following question, "In which city does the Cotton Bowl take place?" with the response "Houston." If a subject responded, "I don't know," that would be an error of omission. Similar studies imply that the FOK distribution properties of both of these types of errors are the same. In two studies at separate universities, the FOK for errors of commission and omission were conducted. In both, the FOK rank order was reliably higher for errors of commission, in spite of the fact that subjects were informed that the items they were judging were answered incorrectly. These results suggest that the type of error made during recall is an important parameter in the feeling of knowing and that type of error may also add validity to subsequent tests of recognition memory for non-recalled items. (CM)

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THE FEELING-OF-KNOWING: ERRORS OF COMMISSION VERSUS ERRORS OF OMISSION

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There are two types of errors made in Feeling-of-Knowing (FOK) studies. One error is commission-type (COM) and the other is omission-type (OM). A COM error occurs when a subject answers a question incorrectly and an OM error occurs when a subject fails to provide an answer for a given question. For example, a subject makes a COM error if he/she responds to the following question, "In which city does the Cotton Bowl take place?", with the response "Houston." If a subject responded to the same question with the response, "I don't know," that would be an error of OM. In previous FOK studies (Hart, 1965; Lachman et al., 1977) only errors of OM were considered in respect to their memorial (or metamemorial) properties. More recently, however, Nelson and his associates (1981) have developed a computerized software package (FACTRETRIEVAL) designed for:

1. Assessing someone's recall of general-information facts
2. FOK judgments for nonrecalled facts, and
3. Recognition of nonrecalled facts.

In otherwords the FACTRETRIEVAL package is a modern methodology for conducting FOK experiments along lines similar to those pioneered by Hart in 1965. One of the major differences, however, in the FACTRETRIEVAL procedure is that both errors of OM and errors of COM are considered in respect to their metamemorial properties. Since these two types of errors are not controlled for by FACTRETRIEVAL procedures than one might ask the question, "Are the distribution properties for each of these error types the same?"

To answer this question data gathered with two separate versions of the FACTRETRIEVAL package were examined. The only programatical difference between these two computer packages was that in the first version the number of alternatives in the forced-choice recognition test for nonrecalled items was 4 and in the second version

the number of alternatives in the forced-choice recognition test for nonrecalled items was 8. The number of subjects sampled with the 4-AFC program was 56 and the number of subjects sampled with the 8-AFC program was 50.

The proportion of COM and OM errors, the proportion of correct detections within error types, the median of the median FOK rank judgments, and the mean Gamma correlations are summarized in the following table.

NELSON'S EXPERIMENTS[1]

	1		2		
	ERROR TYPES		ERROR TYPES		
	OM	COM	OM	COM	
Errors	.518	.482	.470	.530	NS
Detections	.384	.454	.254	.294	NS
FOK Ranks	6.5	10	6.0	9.7	$p < .001$
Mean Gamma	.186	.066	.365	.217	$p < .02$

Interestingly, while the FOK rank order for errors of COM was higher than for errors of OM, the overall Gamma was higher for errors of OM than for errors of COM. This reversal was unexpected and counterintuitive because increasing FOK rank orders and recognition performance should result in higher Gamma correlations if FOK is a valid measure of recognition performance.

Upon closer examination it was noted that approximately 33% of the COM errors were those in which subjects produced distractors that were foils in the N-AFC recognition test. Furthermore, it was also noted that in a number of these errors (41%) the subjects perservated by choosing the same distractor during recognition. Since these perservation errors were given very high FOK ratings and, in every case, produced incorrect detections, the Gamma correlations for these protocols

would be, in fact, artifactually lowered. The proportion of errors, probability of correct detections, median FOK ranks and mean Gamma correlations for distractor-type (DT) and non-distractor-type (NDT) errors is presented in the table below.

NELSON'S EXPERIMENTS

	1		2		
	DT	NDT	DT	NDT	
Error	.282	.718	.383	.617	$p < .001$
Recognition	.456	.454	.230	.335	NS
FOK	11	8.5	11	9.0	$p < .001$
Gamma	.024	.133	.135	.378	$p < .05$

In other words, it would be reasonable to assume that if this perseveration error were eliminated then the probability of a correct recognition for those DT recall errors would be higher than the probability of a correct recognition for those NDT recall errors.[2] In order to test that hypothesis the following FOK investigation was conducted.

Twenty undergraduates from the University of Southern Colorado were paid a nominal fee to participate in a FOK study. Every subject was tested individually. In the first stage of the experiment, subjects were asked to recall the answers to a sample of 240 general information questions (norms provided by Nelson and Narens, 1980). Each question was typed on a standard 3 x 5 card and in order to insure randomness all cards were shuffled prior to presentation. A recall trial consisted of giving the subject a cue (e.g., "Which precious gem is red?") and the subject attempted to recall the target item. Nonrecalled targets were classified into either commission-type (COM) or omission-type (OM) error categories. The recall stage of the experiment was continued until the subject had committed at least 10 of each type of error.

Next, the experimenter formed a pool of 20 nonrecalled items by sampling 10 items from each of the error categories. These items were randomized and presented

to the subject along with the following instructions.

> "We would like you to rank order many of the previous questions that you either failed to recognize or questions that you answered incorrectly in terms of your feeling of knowing. That is you are to rank each of the questions in respect to your ability to recognize the correct answer in a list of four alternatives. The question you rank first should be the question you are most certain of guessing correctly and the item you rank 20th will be the question you are least likely to guess correctly."

Immediately following the FOK judgment stage a memory check of the COM and OM errors was made. Each subject was asked to recall his/her response to each of the sampled nonrecalled target items.

Finally, a 4-AFC recognition test was given for each of the nonrecalled target items.

Results of a Sign Test indicated that the pattern of COM and OM errors during recall was not statistically reliable ($p > .05$). Eight of the twenty subjects produced more COM errors than OM errors. The mean number of OM errors was 16 and the mean number of COM errors was 12.85. This difference was also not statistically reliable $t(19) = 1.16$, $p > .05$. Subjects were able to remember the type of error they made during recall. Classification was 100% for OM errors and 80% for COM errors.

The proportion of correct detections between error types was not statistically reliable with a Sign Test ($p > .05$), however, there was a very reliable difference between the FOK median ranks. The FOK median rank for COM errors was 12.5 and the FOK median rank for OM errors was 7.0. The number reversals across all 20 subjects was 2. As predicted the overall mean Gamma correlation for COM errors and recognition was higher than the overall mean Gamma correlation for OM errors and recognition. This pattern was the reversal of that observed in the previous FACTRETRIEVAL data and approached statistical reliability ($p < .10$).

The proportion of correct detections, FOK median ranks and mean Gamma correlations

are presented in the following table.

KRINSKY'S EXPERIMENT

ERROR TYPES

	OM	COM	
Detections	.44	.48	NS
FOK Rank	7.0	12.5	$p < .001$
Mean Gamma	.12	.29	$p < .10$

The number of distractor-type (DT) and nondistractor-type (NDT) errors was also examined. Proportionally the frequency of DT errors was 45% and NDT error was 54%. While the difference was in the expected direction it was not reliable with a Sign Test ($p > .05$). Proportionally the frequency of correct detections was higher for DT errors (54%) than for NDT errors (41%), however, this difference was also not statistically reliable. The FOK median rank for DT errors was 14 and the FOK median rank for NDT errors was 11.5. This difference was reliable ($p < .02$). As expected the perserveration of DT recall errors during recognition was small (less than 7%) and did not artifactually reduce the overall mean Gamma correlation. In fact, the mean Gamma for DT errors was .38, higher than the mean Gamma for NDT errors which was .20. This difference was, however, not statistically reliable.[3]

The proportion of errors, proportion of correct detections, FOK median ranks and mean Gamma correlations are presented in the following table.

KRINSKY'S EXPERIMENT

Error Types

	DT	NDT	
Errors	.45	.54	NS
Detections	.54	.41	NS
FOK Ranks	14	11.5	$p < .002$
Mean Gamma	.38	.20	NS

These data suggest that the types of errors subjects produce in FOK studies may result in some additional methodological problems for those studies. We also found that when these methodological problems are minimized than error types are an important source of metamemorial information. For example, the FOK judgments for COM type recall errors resulted in reliably higher FOK rank judgments and when perseveration of those errors was controlled than the Gamma correlation for those same items was, in fact, higher than for those OM type errors.

It may be the case that the production of a COM type recall error in a FOK experimental paradigm is mediated by the metamemorial strength of that item.

At this time, we are extending our FOK investigation to include error types produced during the metamemory of information acquired in the laboratory, as well as, error types which occur along with the metamemory for general information.

NOTES

1. Statistical reliabilities were formed by combining the reliabilities derived from both Nelson 1 and Nelson 2 experiments. This procedure is described in Winer (1971, p. 49).

2. The probability of a correct guess, during recognition, should increase for those DT recall errors since subjects would rule out 1 of the distractors and then guess from the remaining subset. This would be most noticeable in Nelson 1 since the probability should increase from .25 to .33, while in Nelson 2 the probability would only increase from .12 to .14.

3. While the number of COM type errors was controlled across subjects, the number of DT and NDT errors varied considerably. Therefore, the decrease in the number of DT to NDT observations produced a considerable increase in our sampling error of the Gamma correlations thereby reducing our statistical power.

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